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(12) **United States Patent**
Proud(10) **Patent No.:** US 9,610,030 B2
(45) **Date of Patent:** Apr. 4, 2017(54) **ROOM MONITORING DEVICE AND SLEEP ANALYSIS METHODS**(71) Applicant: **Hello Inc.**, San Francisco, CA (US)(72) Inventor: **James Proud**, San Francisco, CA (US)(73) Assignee: **Hello Inc.**, San Francisco, CA (US)

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CPC A61B 5/11; A61B 5/1112; A61B 5/1113; A61B 5/1115; A61B 5/1123; A61B 5/1118; A61B 5/0002; A61B 5/4806; A61B 5/7405; A61B 5/742; A61B 2250/12; A61B 2562/0257; A61B

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See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,127,363 A 3/1964 Nitzsche et al.
3,715,334 A 2/1973 Karstedt
(Continued)

FOREIGN PATENT DOCUMENTS

DE 3839900 5/1990
EP 0183553 6/1986
(Continued)

OTHER PUBLICATIONS

Davida, G.I., et al., "On enabling secure applications through off-line biometric identification", Proceedings of the IEEE Symposium on Security and Privacy (May 1998).

(Continued)

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A method monitors a person's sleep parameters, sleep activities, sleep state, or awake status sleep. At least one of a person's motion, movement and gesture is detected for determining a person's sleep parameters, sleep activities, sleep state, or awake status. The at least one of a person's motion, movement and gesture is communicated to a user monitoring device that includes at least two elements selected from: a proximity sensor; a temperature sensor/humidity sensor; a particulate sensor; a light sensor; a microphone; a speaker; two RF transmitters (BLE/ANT+ WIFI); a memory card; and LED's.

12 Claims, 48 Drawing Sheets